

ECS222a Graduate Algorithms

Study Hints for the Final

When preparing for the final, you should look over the lecture topics, your lecture notes, the readings, the “questions to think about”, and all of the homeworks. These suggestions are IN ADDITION to the usual study material. Just following these hints without studying in the usual way WILL NOT be sufficient preparation for the final.

Here are some problems to do, which might well be closely related to problems on the final. Do not hand in the solutions to these problems.

1. Read section 35.2.2 for another example of an inapproximability result, and do question 35.2-2.
2. Do problem 13.2-2 in Chapter 13. We'll use these rotations in one of the problems on the final.
3. Consider the special case of Max-Flow problems in which every edge has capacity one and every vertex has either in-degree 1 or out-degree 1. For example, the Max-Flow problem for Maximum Bipartite Matching has this form.

Show that the distance $d_f(t)$ from s to t in the residual graph determined by any flow f , is at most $V/|g|$, where g is the max-flow in the residual graph G_f .

4. The LP-relaxation approximation algorithm for VERTEX COVER in section 35.4 begins by framing the optimization version of VERTEX COVER as an IP. In the decision version, the input includes an integer k and the output should be YES if there is a vertex cover of cardinality $\leq k$. Frame this as an IP, which is feasible for a YES instance and infeasible for a NO instance. Notice that since we are only interested in the feasibility of the problem, we can use the simple objective function

maximize 0

5. Be sure to do the “question to think about” for the lecture on Fri Feb 25.